REMARKS

Objection to the Disclosure

The Specification presently stands objected to because of the apparent error at page 41, line 18, wherein "main menu function" is erroneously identified with reference numeral "607" instead of "601". Applicant has amended the Specification to correct this error, and it is respectfully submitted that this objection is overcome thereby.

Objection to the Drawings

The drawings presently stand rejected as allegedly failing to comply with 37 C.F.R. 1.84(p)(5) because certain reference signs (specifically, reference signs 145, 165, 250, 270-272, 275, 290-292, 454, 462-465, 468-471, 480, 482, 731, 751 and 882) are not mentioned in the description. This rejection is respectfully traversed. At least some of the foregoing reference numerals in fact do appear in the Specification, including the following reference numerals:

"250" (p. 37, lines 7, 10, 22 – "master bus controller")
"480" (p. 43, line 2 – "logon screen")
"482" (p. 43, line 3 – "user ID field")

Reference numerals 462-465 and 468-471 are also mentioned in the Specification by virtue of the generic reference to "*icons 461 through 472*" at page 43, lines 17 and 19, for example.

With respect to the remaining reference numerals, the Specification has been amended herein to explicitly refer to them. The amendments in this regard are summarized as follows:

"145": The paragraph at page 5, lines 10-21 has been amended to state that "a single main central processing unit (CPU) 146 is used to monitor and control a number of network nodes 150 in a control network 145," and to correct the

reference numeral after "control network" in the last sentence from "140" to –145– (whereas "140" refers to the overall "control system").

"165": The paragraph at page 6, lines 1-8 has been amended to state that "FIG. 4 is a diagram of a network-controlled multiplexed control system 160 in which a network 165 of interconnected CPUs 170 are used to control a number of I/O modules 172," and to correct the reference numeral after "control network" in the last sentence from "160" to –165– (whereas "160" refers to the overall "control system").

"731", "751": The paragraph at page 15, lines 3-12 has been amended to state that the ground stations "are connected to a ground station interface 783 via landlines 751 and thereby to a local area network (LAN) 754," and that "[t]he portable electronic diagnostic equipment 730 is preferably wireless in nature, as represented symbolically in FIG. 27 by the antenna 731 which is shown coupled to the portable electronic diagnostic equipment 730."

"270", "271", "272", "275": The paragraph at page 30, line 7 to page 31, line 2 has been amended to state that "PLC-based control networks have previously been described in general with respect to FIG. 3, and thus a main control network CPU 270, main system bus 271, network nodes 272, and input/output modules 275 all generally correspond to the similar elements depicted in FIG. 3."

"290", "291", "292", "295": The paragraph at page 31, line 12 to page 32, line 8 has been amended to state that "CAN bus based control networks have previously been described in general with respect to FIG. 4, and thus a main CPU 290, CAN bus or device net 291, CPUs 292, and I/O modules 295 all generally correspond to the similar elements depicted in FIG. 4."

"454": The paragraph at page 54, lines 6-12 has been amended to recite that "a network node output drop down menu 453 is displayed by selecting a drop down

menu button 454, providing a list of all system outputs for the selected network node."

It is respectfully submitted that no new matter is added by the foregoing amendments to the Specification, and that the amendments are fully supported by the Specification and/or Drawings and originally filed.

The § 112, ¶ 2 Rejection

Claims 7, 8, and 20-26 presently stand rejected under 35 U.S.C. § 112, ¶ 2 as allegedly indefinite for failing to particularly point out and distinctly claim the subject matter regarded by Applicant as the invention. Specifically, the Office Action asserts that the use of the phrase "may be" in claims 7, 20, and 25 renders the claim(s) indefinite. Applicant has amended each of these three claims to replace the term "may be" with –is–. It is respectfully submitted that this rejection has thereby been traversed.

The Claim Rejections

Claims 1-35 presently stand rejected under § 102(e) as allegedly anticipated by U.S. Patent 6,330,499 B1 (Chou et al). Claim 34 has been cancelled without acquiescence in the grounds of rejection, and without prejudice to pursue at a later time by continuation application or otherwise. With respect to the remaining claims, this rejection is respectfully traversed.

Chou et al '499 relates to a system and method for vehicle diagnostics and health monitoring in which an in-vehicle system 100 communicates wirelessly, via a cellular telephone communication link 150, to a remote service center 200. See, e.g., Fig. 3 of Chou et al '499. The in-vehicle system 100 includes a client computer device 101 which interacts with a vehicle bus 140 via a vehicle bus interface 120. The remote service center 200 includes a diagnostic server 201 which has access to a data repository 203, and communicates with a call center system 202. A service representative affiliated with the call center system 202 may place a voice call to the driver of the vehicle to assist with diagnosis or troubleshooting of a problem. See Chou et al '499 at, e.g., Col. 6:20-33.

The claimed invention differs significantly from the system described in Chou et al '499. In rejecting the instant claims, the Office Action interprets, among other things, the computer device 101 of the in-vehicle computer system 100 of Chou et al '499 as the claimed "wireless diagnostic device," communication link 150 between the in-vehicle system 100 and the remote service center 200 of Chou et al '499 as the claimed "wireless communication channel," and the various portions or interfaces of communication link 150 (such as intranet 150C, Internet 150D, or PSTN 150E) of Chou et al '499 as the claimed "control network." Each of independent claims 1, 11, 20, and 27 has been amended to clarify the subject matter being claimed, and is clearly different that Chou et al '499. Claim 1, for example, presently recites that the wireless diagnostic device is "adapted for manual transport," whereas, in contrast, the computer device 101 of Chou resides in a vehicle.[1] The system of Chou et al '499 is thus quite different from that which is claimed. Moreover, the computer device 101 of the in-vehicle system 100 of Chou et al '499 does not communicate over a "wireless communication channel" with a "control network to be monitored, diagnosed, or tested," as recited in claim 1. None of intranet 150C, Internet 150D, and/or PSTN 150E is a "control network" that is the subject of monitoring, diagnosis or testing by the "wireless diagnostic device." It follows that communication link 150 of Chou et al '499 cannot read on the "wireless communication channel" recited in claim 1, because the communication link 150 of Chou et al '499 is not between a "wireless diagnostic device" and a "control network to be monitored, diagnosed, or tested."

It is therefore respectfully submitted that the subject matter of claim 1 is neither disclosed in nor suggested by Chou et al '499.

Claim 11 likewise recites that the "wireless diagnostic device" is "adapted for manual transport," and further recites the step of transmitting messages between the wireless diagnostic device and an "on-board control network" over a "wireless communication channel." Chou et al '499, as noted, does not disclose or suggest a

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[1] Chou et al '449 states: "The **in-vehicle** hardware provides a platform for the **client comput r device 101**...." (col. 2:56-58), and "[t]he system includes the **in-vehicle** system 100 (**including client computer device 101**) and remote service center 200." (Col. 4:3-6)

wireless diagnostic device that is "adapted for manual transport," nor does it disclose or suggest the transmitting of messages between a wireless diagnostic device adapted for manual transport with an "on-board control network," as recited in claim 11.

Claim 20 presently recites, among other things, a "portable wireless diagnostic device" which comprises a transmitter and receiver for communicating over a wireless communication channel with a "control network to be monitored, diagnosed, or tested." Claim 27 is directed to a system that includes a "plurality" of "portable wireless diagnostic devices," each "communicating wirelessly with one or more control networks to be diagnosed, monitored, or tested." These recitals are similarly not disclosed in nor suggested by Chou et al '499.

It is therefore respectfully submitted that each of independent claims 1, 11, 20, and 27 is patentable over Chou et al '499.

Claims 2-10, 12-19, 21-26, and 28-33, 35 depend from claims 1, 11, 20, and 27, respectively. It is respectfully submitted that each of these dependent claims is allowable as depending from an allowable base claim. While further novel and patentable features are present in the dependent claims, a detailed discussion thereof is not deemed necessary in view of the foregoing.

It is therefore respectfully submitted that all of claims 1-33 and 35 are allowable over Chou et al '499.

Other Claim Amendments

In addition to the amendments referenced above, various claim amendments have also been made to claims 1, 6, 9, 11, 16-19, 21, 25-27, 29-31, and 35.

Claim 1 has been amended to delete the phrase "via a control network wireless interface." Claim 6 has been amended to clarify that the transmitted instruction "prevent[s] further diagnostic activity by said wireless diagnostic device with respect to said control network." Claim 9 has been amended to specify that the graphical display device is "self-contained" and is "physically" connected to a "self-contained" wireless intermediary unit "through a cable connection." In claim 11, the phrase "for the purpose of testing or diagnosing said control network" has been deleted from the body of the claim, and similar language placed in the preamble

thereof. Claims 16-19 have been amended to be consistent with the amendment of the term "on-board control network" in claim 11. Claim 21 has been amended in a manner similar to claim 9. Claims 25 and 26 have been amended to be consistent with the amendment to claim 20 adding the term "portable" before "wireless diagnostic device." Claims 27, 29-31, and 35 have each been amended to delete reference entirely to "wireless communication channels" (replacing that language with "wirelessly communicating") or to plural "wireless communication channels." Claim 35 has also been amended in a manner generally similar to claim 9.

It is respectfully submitted that none of the foregoing amendments impact the allowability of the subject claims, and that they are fully supported by the Specification and/or Drawings as originally filed.

New Claims

New claims 36-50 have been added. Of these, new claims 40 and 45 are independent.

New claims 36, 37, 38, and 39 depend from claims 1, 11, 20, and 27, respectively, and each recites in some manner that control network resides in a vehicle and "controls or monitors electronic functions of the vehicle."

New claim 40, as noted, is independent, and recites, among other things, a "portable diagnostic device" comprising a transmitter and receiver for communicating "over a wireless communication channel with an on-vehicle control network," and "at least one ground station" comprising a ground station receiver "attuned to said wireless communication channel, whereby said ground station monitors messages transmitted over said wireless communication channel between said portable diagnostic device and said on-vehicle control network." It is respectfully submitted that new claim 40 is allowable over Chou et al '499.

New claims 41-44 all depend from claim 40, and should likewise be allowable.

New claim 45, as noted previously, is independent, and is directed to a method including, among other things, the steps of "transmitting diagnostic messages between a portable diagnostic device and an on-vehicle control network over a wireless communication channel," and "monitoring the transmitted diagnostic

messages at a ground station...." It is respectfully submitted that new claim 40 is allowable over Chou et al '499.

New claims 46-50 all depend from claim 45, and should likewise be allowable.

Information Disclosure Statement

A supplemental Information Disclosure Statement is submitted herewith. It is believed that the items cited in the supplemental Information Disclosure Statement do not impact the allowability of the pending claims.

Availability for Further Discussion

The Examiner is invited to contact the undersigned attorney should the Examiner have any questions about this paper, or wish to discuss this application further.

Request for Allowance

It is respectfully submitted that the present application is in condition for final allowance, and issuance of a Notice of Allowance is requested forthwith.

Respectfully submitted,

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**MARKED-UP VERSION OF AMENDED PARAGRAPHS
IN SPECIFICATION SHOWING AMENDMENTS
BY UNDERLINING AND BRACKETS**

At page 5, lines 10-21:

FIG. 3 is a diagram of a PLC-based multiplexed control system 140, in which a single main central processing unit (CPU) 146 is used to monitor and control a number of network nodes 150 in a control network 145. Each network node 150 typically includes a programmable logic controller (PLC) which, in turn, monitors various input signals or conditions (such as temperature, current, speed, pressure and the like) and generates output signals to various output devices (such as actuators, relays or switches) through input/output (I/O) modules 152, thus providing localized control at various network node sites. The main control network CPU 146 communicates with the PLCs of each of the network nodes 150 over a main system bus 147, and provides top-level command and control. The main control network CPU 146 may be physically connected to a test computer 149 from time to time through an RS-232 compatible diagnostic and maintenance port 148, for the purpose of testing and monitoring the functionality of the control network [140] 145 as previously described.

At page 6, lines 1-8:

FIG. 4 is a diagram of a network-controlled multiplexed control system 160 in which a network 165 of interconnected CPUs 170 are used to control a number of I/O modules 172. A main CPU 166 is connected to other dispersed CPUs 170 over a control area network (CAN) bus or device net 167. The CAN bus or device net 167 may be physically connected to a test computer 169 from time to time through a CAN bus or device net gateway 175, which connects to the CAN bus or device net 167 through a CAN bus or device net test port 168. Testing or monitoring of the functionality of the control network [160] 165 may thus be carried out, as previously described.

At page 15, lines 3-12:

In a preferred embodiment, a plurality of ground stations 710, each having an antenna 712, are dispersed in the microcells 762 so as to provide wireless communication capability therein. The ground stations 710, which are connected to a ground station interface 783 via landlines 751 and thereby to a local area network (LAN) 754, may be connected by landlines 713 in any suitable arrangement (e.g., serial chain, loop, or hub-and-spoke arrangements, to name a few). The ground stations 710 provide wireless communication with portable electronic diagnostic equipment 730 within the region covered by the microcells 762. The portable electronic diagnostic equipment 730 is preferably wireless in nature, as represented symbolically in FIG. 27 by the antenna 731 which is shown coupled to the portable electronic diagnostic equipment 730. The ground stations 710 may be located anywhere within the microcells 762, depending in part upon the type of antennas 712 selected. For example, a ground station 710 may be located at the center of a microcell 762 if it uses an omnidirectional antenna 712, or towards the edge of a microcell 762 if a directional antenna 712 is used.

At page 30, line 7 to page 31, line 2:

FIG. 8 is a diagram of a similar control network system 260 wherein a handheld, computerized diagnostic device 261 (preferably embodied as a personal digital assistant (PDA)) communicates with a PLC-based control network 274 over a wireless communication link. PLC-based control networks have previously been described in general with respect to FIG. 3, and thus a main control network CPU 270, main system bus 271, network nodes 272, and input/output modules 275 all generally correspond to the similar elements depicted in FIG. 3. Similar to the control network system 240 shown in FIG. 7, in FIG. 8 the computerized diagnostic device 261 is connected to a wireless intermediary unit 263 (preferably embodied as an RF driver) which preferably has, among other things, an antenna 264 for facilitating wireless RF communication. The computerized diagnostic device 261 sends commands and other instructions in a digital format to the wireless

intermediary unit 263, which re-formats (if necessary) and modulates the data over an RF communication link. A wireless diagnostic and maintenance linking device 267 (also preferably embodied as an RF driver) receives the modulated data from the wireless intermediary unit 263, demodulates the received data and places it in a format compatible with the control network 274. In the example of FIG. 8, the control network 274 includes an RS-232 compatible diagnostic and maintenance port 268, and thus the wireless diagnostic and maintenance linking device 267 would place the received information in a format compatible with the RS-232 protocol. However, any other type of interface between the wireless diagnostic and maintenance linking device 267 and the control network 274 may also be used.

At page 31, line 12 to page 32, line 8:

FIG. 9 is a diagram of another control network system 280 wherein a handheld, computerized diagnostic device 281 (preferably embodied as a personal digital assistant (PDA)) communicates with a CAN bus (or device net) based control network 294 over a wireless communication link. CAN bus based control networks have previously been described in general with respect to FIG. 4, and thus a main CPU 290, CAN bus or device net 291, CPUs 292, and I/O modules 295 all generally correspond to the similar elements depicted in FIG. 4. Similar to the control network systems 240 and 260 shown in FIGS. 7 and 8, respectively, in FIG. 9 the computerized diagnostic device 281 is connected to a wireless intermediary unit 283 (preferably embodied as an RF driver) which preferably has, among other things, an antenna 284 for facilitating wireless RF communication. The computerized diagnostic device 281 sends commands and other instructions in a digital format to the wireless intermediary unit 283, which re-formats (if necessary) and modulates the data over an RF communication link. A wireless diagnostic and maintenance linking device 287 (also preferably embodied as an RF driver) receives the modulated data from the wireless intermediary unit 283, demodulates the received data and places it in a format compatible with the control network 294. In the example of FIG. 9, the control network 294 includes a CAN bus or device net compatible diagnostic and maintenance port 289 and a CAN bus or device net

gateway 288, and thus the wireless diagnostic and maintenance linking device 287 would place the received information in a format compatible with the CAN bus or device net gateway 288. However, any other type of interface between the wireless diagnostic and maintenance linking device 287 and the control network 294 may also be used.

At page 41, line 14 to page 42, line 8:

FIG. 22 is a diagram of a preferred software system architecture as may be used in the computerized diagnostic device illustrated in FIG. 12. As illustrated in FIG. 22, the software system architecture 600 comprises a security checking function 605, a main menu function 601, and a security administration function 607, which preferably (but need not) collectively comprise a software loop as illustrated. The main menu function [607] 601 calls any of a number of subsidiary functions, including a network information function 610, a help function 612, a power function 613, a logo function 614 and an RF test function 615. All of the foregoing functions 601, 605, 607, 610, 612, 613, 614 and 615 may be viewed as "network independent" in the sense that they do not depend upon the nature of the control network being tested or diagnosed. The network information function 610 in turn accesses a variety of additional subsidiary functions, including a system check function 620, an input check function 621, a force output function 622, and a real-time monitoring function 623. These latter functions 620, 621, 622 and 623 may be viewed as "network dependent" in certain aspects because they may depend or can be optimized for particular network configurations, types or implementations. Further details regarding the software functions appearing in FIG. 22 will be described or become apparent in the discussion of the test and diagnostic functions of the personal digital assistant 420.

At page 54, lines 6-12:

In a preferred embodiment, a control module drop down menu 452 is available by selecting a drop down menu button 451, providing a list of all network nodes of the control network 218. The user may thereby select a particular network node for diagnostic testing. When a network node is selected, a network node output drop down menu 453 is displayed by selecting a drop down menu button 454, providing a list of all system outputs for the selected network node. The user may then scroll through the list and select a particular system output to be tested using the real time monitoring function.

MARKED-UP VERSION OF CLAIMS SHOWING AMENDMENTS BY UNDERLINING AND BRACKETS

1. (Amended) A system for facilitating diagnosis and maintenance of electronic control networks, comprising:

a wireless diagnostic device adapted for manual transport, said wireless diagnostic device comprising a transmitter and receiver for communicating over a wireless communication channel with a control network [via a control network wireless interface] to be monitored, diagnosed, or tested; and

at least one wireless ground station, said at least one wireless ground station comprising a ground station receiver attuned to said wireless communication channel, whereby transmitted messages between said wireless diagnostic device and the control network over said wireless communication channel are monitored.

6. (Amended) The system of claim 4, whereby an instruction to terminate a diagnostic session is transmitted by said ground station transmitter over said wireless communication channel in response to a command entered via said user interface, said instruction preventing further diagnostic activity by said wireless diagnostic device with respect to said control network.

7. (Amended) The system of claim 1, further comprising a diagnostic and maintenance information database connected to said at least one ground station, whereby information relating to said control network [may be] is retrieved in response to a remote request received from said wireless diagnostic device.

9. (Amended) The system of claim 1, wherein said wireless diagnostic device comprises a self-contained graphical display device physically connected to a self-contained wireless intermediary unit through a cable connection, said wireless intermediary unit containing said transmitter and receiver for communicating over said wireless communication channel with said control network.

11. (Amended) A method of testing or diagnosing an on-board control network, comprising the steps of:

transmitting messages between a wireless diagnostic device and [a] the on-board control network over a wireless communication channel [for the purpose of testing or diagnosing said control network], said wireless diagnostic device adapted for manual transport; and

monitoring the transmitted messages at a wireless ground station, said wireless ground station comprising a ground station receiver attuned to said wireless communication channel.

16. (Amended) The method of claim 11, further comprising the step of retrieving, in response to a remote request received from said wireless diagnostic device, information relating to said on-board control network from a diagnostic and maintenance information database connected to said ground station.

17. (Amended) The method of claim 16, wherein said information relating to said on-board control network comprises graphical information relating to said on-board control network, said method further comprising the step of displaying said graphical information on a screen display at said wireless diagnostic device.

18. (Amended) The method of claim 11, wherein said step of transmitting messages between said wireless diagnostic device and the on-board control network over said wireless communication channel comprises the steps of transmitting messages between a wireless intermediary unit and the on-board control network over said wireless communication channel, said wireless intermediary unit connected to a graphical display device.

19. (Amended) The method of claim 11, further comprising the steps of:

transmitting from said wireless diagnostic device, in response to an entered command, a forced output instruction to said on-board control network over said wireless communication channel;

receiving said forced output instruction at said on-board control network; and

in response to said forced output instruction, selecting values for one or more inputs to a controlled electronic circuit such that an output of a control network element is forced to a predetermined state, in the absence of a fault condition.

20. (Amended) A diagnostic and maintenance system, comprising:

a portable wireless diagnostic device, said wireless diagnostic device comprising a transmitter and receiver for communicating over a wireless communication channel with a control network [via a control network wireless interface] to be monitored, diagnosed, or tested;

a plurality of wireless ground stations, at least one of said wireless ground stations comprising a receiver attuned to said wireless communication channel whereby transmitted messages between said portable wireless diagnostic device and the control network are monitored;

a ground station interface connected to said plurality of wireless ground stations; and

a local area computer network connected to said ground station interface, said local area computer network comprising one or more user terminals, said one or more user terminals each comprising a screen display whereby information relating to said transmitted messages [may be] is displayed.

21. (Amended) The diagnostic and maintenance system of claim 20, wherein said portable wireless diagnostic device comprises a self-contained graphical display device physically connected to a self-contained wireless intermediary unit through a cable connection, said wireless intermediary unit containing said transmitter and receiver for communicating over said wireless communication channel with said control network.

25. (Amended) The system of claim 20, further comprising a diagnostic and maintenance information database connected to said local area computer network, whereby information relating to said control network [may be] is retrieved in response to a remote request received from said portable wireless diagnostic device.

26. (Amended) The system of claim 25, wherein said information relating to said control network comprises graphical information relating to said control network, said graphical information being displayed on a screen display at said portable wireless diagnostic device.

27. (Amended) A diagnostic and maintenance system, comprising:

a plurality of portable wireless diagnostic devices, each comprising a transmitter and receiver, said portable wireless diagnostic devices communicating [over a plurality of wireless communication channels] wirelessly with one or more control networks to be diagnosed, monitored, or tested, each of said portable wireless diagnostic devices programmed to perform at least one diagnosis or test function relating to said one or more control networks; and

at least one wireless ground station, said at least one wireless ground station comprising a ground station receiver attuned to at least one [said] wireless communication [channels] channel utilized by said portable wireless diagnostic devices, whereby transmitted messages between said portable wireless diagnostic devices and said one or more control networks [over said wireless communication channels] are monitored.

28. (Amended) The diagnostic and maintenance system of claim 27, further comprising a ground station interface connected to said at least one wireless ground stations, and a local area computer network connected to said ground station interface, said local area computer network comprising one or more user terminals, said one or more user terminals each comprising a screen display whereby information relating to said transmitted messages [may be] is displayed.

29. (Amended) The diagnostic and maintenance system of claim 28, further comprising a memory storage device connected to said local area computer network, for storing transmitted messages monitored by said at least one wireless ground station [over said wireless communication channels].

30. (Amended) The diagnostic and maintenance system of claim 28, whereby instructions regarding diagnostic or test procedures are wirelessly transmitted by said at least one ground station [over said wireless communication channels] in response to commands entered via said user terminals.

31. (Amended) The diagnostic and maintenance system of claim 28, whereby an instruction to terminate a diagnostic session is wirelessly transmitted by said at least one ground station [over a selected one of said wireless communication channels] in response to a command entered via one of said user terminals.

32. (Amended) The system of claim 28, further comprising a diagnostic and maintenance information database connected to said local area computer network, whereby information relating to said one or more control networks may be retrieved in response to a remote request received from any of said portable wireless diagnostic devices.

33. (Amended) The system of claim 32, wherein said information relating to said control network comprises graphical information relating to a control network, said graphical information being displayed on a screen display at the requesting portable wireless diagnostic device.

35. (Amended) The diagnostic and maintenance system of claim [34] 27, wherein each of said portable wireless diagnostic devices comprises a self-contained graphical display device connected to a self-contained wireless intermediary unit through a cable connection, said wireless intermediary unit containing said transmitter and receiver for wirelessly communicating with said one or more control networks [over a selected one of said wireless communication channels].